

# LIST

LONG ISLAND SINCLAIR TIMEX GROUP  
INCORPORATING \* NYTSE OF NEW YORK CITY

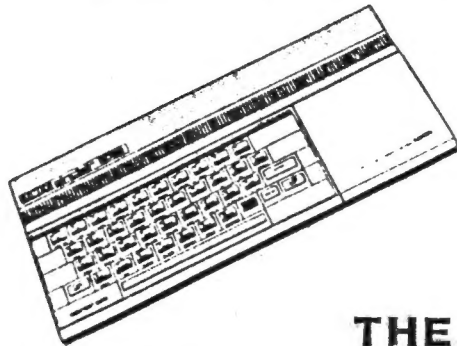
ISSUE: October 1990

\* NEW YORK TIMEX SINCLAIR ENTHUSIASTS: NEXT MEETING November 4



DISK DRIVES SUPPORTED:  
1 OLIGER  
2 LARKEN  
3 AERCO

LIST MEMBERSHIP IS \$15.00. LIBRARY TAPES ARE AVAILABLE, WRITE THE ADDRESS PRINTED BELOW.



COHENS CORNER  
=====

KEY CARD FOR TS-2068  
=====

2068 Power Supply  
Make It Cooler & Quieter



## THE CASSETTE CONNECTION

=====

////////////////////

=====

L.I.S.T.  
5 PERI LANE  
VALLEY STREAM, NY  
11581



TO: Don Lambert JAN/91  
1301 Killinger PL  
Auburn, IN  
46706

UPPER RIGHT  
CORNER OF  
YOUR LABEL  
IS DATE OF  
LAST ISSUE.

FIRST CLASS MAIL  
DATED MEETING NOTICE

1

November 4



-----  
LIST OFFICERS  
-----

PRES. HARVEY RAIT  
TRES. ROBERT MALLOY  
COR. SEC. JOHN PAZMINO  
EDITOR. FRED STERN  
LIBR. TOM SKAPINSKI  
-----

PLEASE SEND INQUIRIES TO:

LIST

MR. HARVEY RAIT

5 PERI LANE

VALLEY STREAM, N.Y. 11581

PLEASE SEND SUBMISSIONS TO:

LISTING

MR. FREDERIC STERN

214 ROBERTS ST.

HOLBROOK, N.Y. 11741  
-----

NYTSE

NYTSE MEETS THE MONDAY AFTER  
THE LIST MEETING AT:  
MISS KIMS RESTAURANT  
PARK AVENUE SOUTH  
BETWEEN 21 ST. AND 22 ST.  
MEETINGS START 7:30 PM.  
EC

-----  
COMING EVENTS:  
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NOV. 4, 1990 LIST MEETING  
NOV. 5, 1990 NYTSE MEETING

MEETING MINUTES  
OCT. 14, 1990  
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HARVEY CALLED THE MEETING TO  
ORDER AT 2:30PM.

LIST SOLD 2 MORE COPIES OF  
TECHNICAL TIDBITS, FRED TO SHIP.

WE RECEIVED 3 INQUIRIES FROM  
PEOPLE WANTING INFORMATION ABOUT  
T/S EQUIPMENT, AND ABOUT LIST.  
JOHN PAZMINO TO ANSWER.

A DISCUSSION WAS HELD ABOUT LIST  
PROGRAM TAPES. A LIST OF PROGRAM  
TITLES WILL BE IN THE NEXT ISSUE  
OF LISTING.

FRED REQUESTED THAT MEMBERS SEND  
PRINTOUTS OF PROGRAMS FOR AN  
UP-COMING PROGRAM ISSUE OF  
LISTING.

LIST EQUIPMNT SALE

LIST HAS THE FOLLOWING EQUIPMENT  
FOR SALE:

QL-GREAT COND.	\$80.00
T32068-EXCELLENT VALUE	\$50.00
T32040-PRINTER	\$15.00
TAPE RECORDER-PANASONIC	\$15.00
QL MOD. ADAPTER	\$20.00
TABMAN PRINTER INTERFACE	\$25.00

THE ABOVE EQUIPMENT CAN BE SEEN  
AND PURCHASED AT THE NEXT LIST  
MEETING.

CLASSIFIEDS

-----  
THIS CLASSIFIED SECTION IS  
AVAILABLE TO ALL LIST MEMBERS  
FREE OF CHARGE.  
THE ONLY RESTRICTION IS THAT  
IT IS TO BE USED ONLY FOR THE  
SEEKING, SELLING OR SWAPPING  
OF SINCLAIR, TIMEX OR MICROACE  
COMPUTER EQUIPMENT, PERIPHERALS  
AND SOFTWARE.  
LISTING, LIST, AND ITS OFFICERS  
DO NOT ENDORSE, WARRANTY, OR  
GUARANTEE ANY OF THE ITEMS  
LISTED IN THIS CLASSIFIED  
SECTION  
-----

I AM LOOKING FOR SOFTWARE TO  
DRIVE AN AERCO INTERFACE AND  
GORILLA PRINTER WITH A T31000.  
PLEASE CONTACT FRED AT  
516-737-0963.

T31000, T32068, COMPUTERS AND  
PERIPHERALS FOR SALE.  
PAUL DONNELLY, 516-261-6934.

A FINAL WORD

-----  
MY NAME IS FRED STERN AND I AM  
THE EDITOR OF THIS EDITION OF  
LISTING.

MANY THANKS TO TOM SKAPINSKI,  
MYLES COHEN AND THE MANY PEOPLE  
WHO CONTRIBUTED TO THIS EDITION.

OUR ARTICLE BANK IS RUNNING LOW.  
PLEASE CONTRIBUTE NEWSWORTHY  
ARTICLES AND HELP SUPPORT YOUR  
SINCLAIR-TIMEX NEWSLETTER.

SEE YOU ALL AT THE NEXT MEETING.

**TIMEX** **sinclair 1000**

**ZX-81 AND T31000**  
-----

**TECHNICAL TIDBITS**  
-----

\$4.00 \$4.00 \$4.00

**SECOND PRINTING**  
-----





## OCTOBER NEWS

## ROUNDUP

BY TOM SKAPINSKI

**EMSOFT Division, Estate Management Services**, P.O. Box 8763, Boston, MA 02114-8763 Has for sale a word processor for the TS-1000 That can print in lower case to the TS-2040. It is called 'WORD\*'. It occupies only 4K and can be ordered to support other printers and interfaces...Specify printer and If. when ordering..PRICE \$19.95

**OZX Newsletter reports** ComLink 1 provides RS-232C Connection and a terminal program in ROM for the TS-1000, ZX-81. Write to A. Echardt 918 Anna ST, Boalsburg, PA 16827 (About \$54.95)

**ZEBU (Zunks Extra Basic Utilities)** 38 New commands and functions for the TS-2068....From Zunk Custom Electronics, 1414 Ferris, Waxahachie, TX 75165 >>>PRICE \$20.00<<<

**Blank Tapes** New C-10 tapes "IRISH" brand Twenty Four for Four Dollars plus \$2.50 S/H...Order from **Com Skapinski, 7 Atkinson LN, Coram, NY 11727-3004**>>>U.S.A. orders only! These tapes have index cards but no boxes are supplied... Sorry about that!

**Pix-Px I** by **Michael DiRienzo** order from 'VectorWare, 4128 1/2 California AVE, SW Seattle WA 98116 ..PRICE \$20.00..Phone (206) 935-9272

**Spectrum Emulation** for the TS-2068 (Some hardware modification required) Special rom. Order from **Jack Dohany, 390 Rutherford AVE, Redwood City, CA 94061**....Write for more information.

**747 Flight Simulator**...for TS-2068. Write to **Bob Swoger, 613 Parkside CR Streamwood, ILL 60107**.... PRICE ?? Fairware...

**North America C/S Database**...Register now.. send postcard with name, address and type of C/S Computer used. Send to **Mountaineer Software, 749 Hill ST #9, Parkersburg, WV 26104**...Free service!

**LKDOS loader** for **LARKEN** Disk system. Will load your programs and files from list printed on screen by simply moving the cursor over the one you want to load. No typing in names and extensions anymore. A great help to LARKEN users. PRICE \$5.00. Order from **Tom Skapinski, 7 Atkinson LN, Coram NY 11727**.. CANADA orders \$5.75 includes S/H.

Hope you are enjoying this feature of the Newsletter. It will be included from time to time as information that may be of interest to club members comes to my attention, and there is room available in the newsletter to be able to be included.....

L.I.S.T  
L.I.S.T  
L.I.S.T



Row 1	1	2	3	4	5	6	7	8	9	0
Row 2	20	21	22	23	24	25	26	27	28	29
Row 3	30	31	32	33	34	35	36	37	38	39
Row 4	CAPS SHIFT	40	41	42	43	44	45	46	47	S/S Brk C/S
Row 5			S-P-A-C-E		B-A-R					

### SYMBOL REFERENCE GUIDE

SYMBOL	ON KEY	REF NO	MODE	SYMBOL	ON KEY	REF NO	MODE
+	K	37	S/S	(	8	8	S/S
-	J	36	S/S	)	9	9	S/S
*	B	44	S/S	[	Y	25	XE
/	V	43	S/S	]	U	26	XE
<	L	38	S/S	ON ERR	F	33	XE
>	R	23	S/S	SOUND	G	34	XE
<=	T	24	S/S	?	C	42	S/S
>=	Q	20	S/S	!	1	1	S/S
<>	E	22	S/S	@	P	29	XE
2	U	21	S/S	Q	2	2	S/S
\$	X	41	S/S	&	2	2	S/S
:	4	4	S/S	%	3	3	S/S
;	Z	40	S/S	#	3	3	S/S
,	N	28	S/S	-	0	0	S/S
.	M	45	S/S	/	D	32	XE
..	P	40	S/S	STICK	S	31	XE
'	7	29	S/S	FREE	A	30	XE
		7	S/S	↑	H	35	S/S

### QUICK REFERENCE GUIDE

COMMAND	ON KEY	REF NO	MODE	COMMAND	ON KEY	REF NO	MODE
ABS	G	34	E	LINE	3	3	XE
ACS	Y	21	XE	LIST	K	37	K
AND	Y	25	S/S	LLIST	V	43	E
ASN	Q	20	XE	LN	U	40	E
AT	I	27	S/S	LOAD	Z	36	K
ATN	E	22	XE	LPRINT	J	42	E
ATTR	L	38	XE	MERGE	C	24	XE
BEEP	Z	40	XE	MOVE	T	6	XE
BIN	B	44	E	NEU	6	30	K
BORDER	B	44	K	NEXT	A	45	K
BRIGHT	B	44	XE	NOT	S	31	S/S
CARS LOC	2	2	C/S	OPEN#	4	4	XE
CAT	9	9	XE	OR	U	26	S/S
CHR\$	U	26	E	OUT	O	28	XE
CIRCLE	H	35	XE	OVER	N	45	XE
CLEAR	X	41	K	PAPER	C	42	XE
CLOSE#	S	5	XE	PAUSE	M	46	K
CLS	V	43	K	PEEK	O	20	E
CODE	I	27	E	PI	M	46	E
CONTINUE	C	42	K	PLOT	Q	20	K
COPY	Z	40	K	POINT	8	8	XE
COS	U	21	E	POKE	8	28	K
DATA	D	32	E	PRINT	O	29	K
DEF FN	1	1	XE	RANDOMIZE	P	24	K
DELETE	0	0	C/S	READ	T	30	K
DIM	D	32	K	REM	A	22	E
DRAW	U	21	K	RESTORE	E	31	K
EDIT	1	1	C/S	RETURN	S	25	K
ERASE	7	7	XE	RND	Y	24	K
EXP	X	41	E	RUN	T	23	K
FLASH	V	43	XE	SAVE	R	31	K
FN	2	2	XE	SCREEN\$	S	37	XE
FOR	F	33	K	SGN	K	33	E
FORMAT	0	0	XE	SIN	F	20	E
GOSUB	H	35	K	SQR	Q	35	E
GOTO	G	34	K	STEP	H	32	S/S
GRAPHIC	9	9	C/S	STOP	D	30	S/S
IF	U	26	K	STR\$	A	25	E
IN	I	27	XE	TAB	Y	29	E
INK	X	41	XE	TAN	P	22	E
INKEY\$	N	45	E	THEN	E	34	S/S
INPUT	I	27	K	TO	G	33	S/S
INT	R	23	E	TR VIDEO	F	3	C/S
IN VIDEO	4	4	C/S	USR	3	38	E
INVERSE	M	46	XE	VAL	L	36	E
LEN	K	37	E	VAL\$	J	36	XE
LET	L	38	K	VERIFY	R	23	XE

On 12,000 I could upgrade to the ibe clone equivalent of about \$4500 worth of hardware. The 5f software is faster and more memory conservative on the whole and my only complaint is with the functionality of ATARI Corp., not the hardware or software, as seems to be the case with most people who have become proficient in both worlds.

Most people who flame out on ATARI's computability have not been able to master the programming techniques and probably prefer the primitive anachronism called CLI to a more practical GUI. They will probably stay with a CLI when the cutting edge is voice communication!

WHY?

For the same reason a large segment of society still shuns computers entirely. They do not have the ability to adapt to a changing social and technological environment. This minority will die off in a generation or two anyway. It is the natural order of things...

#1 35870 88/Hot Topics  
01-Sep-90 00:48:07  
Sbr #35858-Atari on TV  
Fm D. Stuart 76703,202  
To: Bob Retelle 71550,3312

It DOES work, you know... I put something like that together with six TS1000 TIMEXes about four years ago. Bought a mess of these solid-state memories from some outfit called MEMOTEC and patched up a 512K hypergon that does wierd things that I can't figger how to transport the I/O!

My kids play six-way war games on it with their friends!

#1 35869 88/Hot Topics  
01-Sep-90 00:44:46  
Sbr #35848-Atari on TV  
Fm D. Stuart 76703,202  
To: Brian Converse 72260,3033

Sounds like the making of a hypercomputer to me! But will it run LINDA ???

#1 35877 88/Hot Topics  
01-Sep-90 01:48:38  
Sbr #35848-Atari on TV  
Fm PETER GRECI 76104,2110  
To: Brian Converse 72260,3033

Lets do it Bro we'll corner the market

#1 35871 88/Hot Topics  
01-Sep-90 00:53:59  
Sbr #35859-Atari on TV  
Fm D. Stuart 76703,202  
To: Bob Retelle 71550,3312

Now there's another one! No, I haven't done it, but I was discussing TIMEXes last month with this guy back (up in?) < over there in 777 > in NM or VT and anyway, seems he hacked up an alternate DOS in the shadow RAM of a 78K TS2068!

Said (sic): he finally found some affordable SIMMs and so far has put together 16 meg of battery-backed RAM that is directly addressable! That I would like to see for real! Course, I won't call him a liar without proof and it does sound feasible!

#1 35929 88/Hot Topics  
01-Sep-90 14:17:53  
Sbr #35870-Atari on TV  
Fm Bob Retelle 71550,3312  
To: D. Stuart 76703,202

Now THAT is neat!!

Just think.. if you could add enough nodes to simulate synaptic functions, you could end up with a "self-aware" Timex/Sinclair ZX81...

"Dave... Dave... What are you doing...? Dave..."

BobR

#1 35933 88/Hot Topics  
01-Sep-90 17:27:06  
Sbr TIMEX Thread (X)  
Fm D. Stuart 76703,202  
To: Bob Retelle 71550,3312

I thought HAL had those lines copyrighted!

L.I.S.T.  
L.I.S.T.  
L.I.S.T.

#1 36006 81/Forum Business  
03-Sep-90 04:11:59  
Sbr networked STs/hypercube  
Fm Brian Converse 72260,3033  
To: Bob Retelle 71550,3312

Bob- the hypercube was neat, aside from the comm. technique: it started to cause problems when data/requests had to make too many hops. the latest Transputer design includes a switch that tries to optimize the connection, but in the end, you have a h/w structure that is like a 'cube' in another way: far too rigid. Somebody will likely flame me to death on that, it's a personal opinion.

I prefer the innocuous single-user computer with a wire going out the back. You leave it on at night and the wires all connect to each other somehow and this monster grows out of the small indiv. machines. You come back in the morning and zap the connection and your friendly personal machine is back.

Maybe if someone got ambitious, a Linda-type scheme might be effected as a Linda conference: one good reason for everyone to be online simultaneously. They could grab the Weather data for the entire US and predict the next day's weather or Atari's stock price in 6 months.

#1 36010 88/Hot Topics  
03-Sep-90 04:12:17  
Sbr #35927-Atari on TV  
Fm Brian Converse 72260,3033  
To: Bob Retelle 71550,3312

..Bob- a "self-aware ZX81"? THAT's not very useful! A self-aware ant is not much good, but a bunch that think they are some greater entity that can chew its way through your house is something to be reckoned with!

#1 36034 88/Hot Topics  
03-Sep-90 17:06:31  
Sbr #36005-Linda Atari  
Fm D. Stuart 76703,202  
To: Brian Converse 72260,3033

Well Raytracing and many other graphics activities are qualitative rather than quantitative, therefore, I doubt ab larger machine would improve the activity.

That's all a hypercomputer is - a larger machine. In Series. Tie together fifty computers and you get the cumulative result. If the slowest processor is 2mhz, then the sum of the network will be fairly close to that. Oversimplified again, but that's the gist.

In other words, ten machines doing a raytrace would not get it done any faster than one. The computations would be done faster, but the results wouldn't be rendered any faster. It would be necessary to increase the speed of the parent processor.

#1 36104 88/Hot Topics  
04-Sep-90 13:06:16  
Sbr #36102-Linda Atari  
Fm MYLES COHEN 71570,3142  
To: D. Stuart 76703,202

..Aw, C'mon! What's LINDA?

#1 36158 88/Hot Topics  
05-Sep-90 02:24:36  
Sbr #36095-Linda Atari  
Fm Brian Converse 72260,3033  
To: MYLES COHEN 71570,3142 (X)

MYLES,

D. gave you the short form as I see it, Linda is most flexible approach to parallel processing around. And, one can craft a Linda system using a chunk of free memory and a background process. As most ST users have a RAMdisk running and an onscreen clock, there you have examples of both. Then you add some external communications, like taking over the serial or midi ports, so's you can share computation with another machine(s). Linda does not explicitly describe this comm, as every processor supposedly accesses something called 'tuple space'. Linda was developed at Yale, and you can get more info from them:

"How to Write Parallel Programs, A Guide to the Perplexed" by Nicholas Carriero and David Gelernter. Research Report YALEU/DCS/RR-628 May 1988

"Linda in Context" Ibid. Research Report YALEU/DCS/RR-622 April '88

and other reports can be had from Yale University Dept. of Computer Science/New Haven CT 06510 (for some such Zipcode). they use it for DNA research; always wanted to check that out, but the Howard Hughes folks in our building are working on human gene something some pretty bizarre people walk into the lobby, and never seem to notice them going OUT. was hoping to get a group visit set up (safety in numbers...).

#1 30493 81/Forum Business  
23-Apr-90 22:27:52  
Sbr #30476-COLOR TO MONO  
Fm D. Stuart 76703,202  
To: MYLES COHEN 71570,3142 (X)

Hey! Sheesh! I didn't think there were any 2068ers still around! I have one of those boasties complete with what amounts to full-color med-res output and all that.

Anyway, before the peripheral market died I managed to get a 3008 modem for it and now I just do a direct comlink via the phone to the SUPRA 2400. I use FLASH as a terminal and capture everything to it. I haven't had the time to figure out how to use this link for direct disk access so I could use the ST environment for direct storage (tapes are a discouraging medium!), but I know it can be done.

As ascll files go, just pretend your 1040 is a 808 and go for it. If you don't have a modem for the 2068, you're in trouble because the 2068 does not directly support any of the standard I/O hardware...

I have a parallel printer interface and a serial modem interface, therefore, I can get in and out, but the interfaces are piggybacked off the main processor at the right rear of the 2068...

One of these days I would like to be able to read some of that old-fashioned PIC

Keywords: STARTUP STARTUP-SCREEN M.C.ESCHER ESCHER DRAWING HANDS PICTURE

An excellent StartupScreen! Shows M.C.Escher's drawing hands. Just extract the file and copy it to your System Folder, then reboot. Worth the download! Click the Stuffit Comments button for more info.

Bill Aycock



## COHENE CORNER =====

AS PROMISED IN LAST MONTHS  
NEWSLETTER, WE BRING YOU A  
TRANSCRIPT OF A MESSAGE OUR  
FRIEND MYLES COHEN RECEIVED ON  
COMPUSEVE.  
HOPEFULLY MYLES (THE MAVIN FROM  
NYTSE) WILL ENLIGHTEN US WITH  
MORE INTERESTING ARTICLES.

# 30533 81/Forum Business  
24-Apr-90 13:26:59  
Sb: #30533-COLOR TO MONO  
Fm: Rick Meredith 76157,30  
To: MYLES COHEN 71570,3142 (X)

Do you have a serial port on the 2068?

# 30538 81/Forum Business  
24-Apr-90 15:12:59  
Sb: #30533-COLOR TO MONO  
Fm: MYLES COHEN 71570,3142  
To: Rick Meredith 76157,30

Hello Rick,

Why yes, I do have a serial port on the 2068. Well, actually it is on the Portuguese Disk Driver but it amounts to the same thing...

Only thing is, I don't know very much about it. Hm...Why do you ask?

Last time I looked at my CompuServe bill, it said that I was \$15 away from my limit for the month which means I say not be able read your reply...Maybe I still have a few more peeks left, thanks be to Jim Ness' QUICHIS.

Anyway I await your suggestions.

MYLES

X No waiting messages  
# 30572 81/Forum Business  
25-Apr-90 04:02:00  
Sb: #30520-COLOR TO MONO  
Fm: D. Stuart 76703,202  
To: MYLES COHEN 71570,3142 (X)

Myles:

Is that Portuguese Box you mention still available? And who from? I would like to be able to set my 2068 up so I could use drives other than this mickymouse porting. For one thing, I cannot run programs written on the TS thru the port. I have to load them out of the buffer onto tape, then reload them into the system to run. Humbug!

Dave S.

# 30577 81/Forum Business  
25-Apr-90 07:55:06  
Sb: #30572-COLOR TO MONO  
Fm: MYLES COHEN 71570,3142  
To: D. Stuart 76703,202 (X)

D.,

I have some bad news for you. The Portuguese Disc Drives (with not one but two serial ports on the controller) is no longer being sold in the United States. They were being imported at one time by ZEBRA (718) 296 2385 ) and they might give you some further help on the matter. From time to time you might be fortunate enough to find the Portuguese Drivers, usually called the ZEBRA drives at a swap meet of a Times-Sinclair Users group.

These drives are manufactured by TINEK OF PORTUGAL so you might be able to learn something from them. Of course, if you have a friend that is going to Portugal, you might be able to persuade him to bring one back for you. Good luck,

MYLES

## ZX-81 AND TS1000

## TECHNICAL TIDBITS

# 33585 88/Hot Topics  
15-Jul-90 06:59:23  
Sb: #33578-Official Announcements:TT  
Fm: D. Stuart 76703,202  
To: Brian Converse 72260,3033

from past experience with SIR CLIVE, wherein I sold his soon programs in days long gone, he will probably pack 8 processors/16meg of RAM/a MORH drive and 21inch photoluminescent display into a chicken box and sell it for \$299.00

He will sell 10 million of these things and the world computer consumer will laugh their heads off before they figure out they don't know beans about programming it and they will turn up five years later in Goodwill Stores all over America - while Clive buys another island in the Carib and dreams up the ultimate android!

# 33586 88/Hot Topics  
15-Jul-90 07:03:04  
Sb: #33580-Official Announcements:TT  
Fm: D. Stuart 76703,202  
To: Bob Retelle 71550,3312

It may not have happened for the ZX, but it did for the SPECTRUM! And that was a better upgrade path, anyway.

# 33580 88/Hot Topics  
15-Jul-90 05:31:00  
Sb: #33578-Official Announcements:TT  
Fm: Bob Retelle 71550,3312  
To: Brian Converse 72260,3033

Interesting..! One difference though.. "Uncle Clive" usually delivers on his promises...

(Though I do remember him saying he would have \$99 disk drives for the Sinclair ZX series... which never happened...)

BobR

# Reply: 33586

# 33578 88/Hot Topics  
15-Jul-90 03:39:15  
Sb: #33561-Official Announcements:TT  
Fm: Brian Converse 72260,3033  
To: Bob Retelle 71550,3312 (X)

In somewhat related vein- (only in the U.S.), Sir-Clive (Sinclair) is at it again- see July '90 ELECTRONICS' "Parallelism for All!" That's the promise of Clive Sinclair and his 'Hyper-RISC' processor... 'A feature is 'Transputer-like' communications ports that will allow any number of the chips to run in parallel'...

# 33624 88/Hot Topics  
15-Jul-90 06:41:00  
Sb: #33585-Official Announcements:TT  
Fm: Brian Converse 72260,3033  
To: D. Stuart 76703,202 (X)

OK- perhaps more will be exciting (again, from July '90 Electronics) "...the design objectives include processing 200 million instructions per second, and execution of any standard processor-including those from Intel Corp. and Motorola...

"...There are single-processor computers and there are parallel arrays," he says. "Our new chip is designed to do both." He classifies it as a 'hyper-RISC' processor. A feature is "Transputer-like" communications ports that will allow any number of the chips to run in parallel...

"...It's a full custom chip, not a gate array, with a lot of new technology. It has custom RAM and custom ROM, and both are far faster than anything that has been done before," says Sir Clive.

"It's basically a 32-bit chip," he explains. "We have put a lot of work into making fast adders and other processing elements, and especially on-chip RAM. We designed it to have a 3-to-4 ns access time. The chip handles its own memory management..." and has on-chip video drive and input-output circuits, so it's truly a one-chip solution..."

"...various tricks" allow efficient use of external RAM: "It accesses external memory in page mode (page mode: DRAMS essentially dispense with one of the two required strobes whilst one stays within the 'page', which is DRAM array geometry-dependent, essentially cutting access time in half =>RC) (funny DRAMS such as static column, VRAM, nibble- and page- mode are less dependable than vanilla DRAM since they're lower volume items and each mfr has differing ideas of what it should do, making 'stuff your own' more chancy=>RC)..."

# 33651 88/Hot Topics  
15-Jul-90 00:41:16  
Sb: #33585-Official Announcements:TT  
Fm: Brian Converse 72260,3033  
To: D. Stuart 76703,202 (X)

(more Sinclair hyper-RISC (a Electronics July 90 p. 32) (accesses external memory in page mode...) "...that way it can address multiple banks of memory using just 32 pins and there is no limit on the amount of memory it can handle" (one presumes this hinges highly on program locality, something real-time processes, say interrupt-driven come in a multitasking machine, do not exhibit- like cache, the page-mode would slow considerably due to thrashing. RISCheads respond by asserting that if you just add cache...but page-mode DRAMS come in limited page sizes=>RC)

"...We can pull off instructions very, very fast because they are only 8 bits long and we can queue them on the chip. Also on the chip we have a very-high-speed ROM for subroutines that can store macros..."the chip could be set up to use the same instruction code as industry-standard CPUs. "We will do with software what others do with hardware..."

"...300-by-300 mils die area (small!!)..."staked, balanced logic"...logic swings of 100 mV (the smaller the swing into given internal trace capacitance, the faster & lower power switching is=>RC)...equivalent switching speed of 100 ps, although that is achieved by stacking multiple instructions in RUP (pipelining or ?)

"...And on top of that we are using self-timing. It's self-clocking and it runs at its own speed. When it talks to the outside world, it's clocked, but internally, it runs as fast as it can, and that is a considerable advantage. Normally you design for the slowest possible gate so everything else runs a lot slower than it could do." (more, but...where's chip's now in lot silicon)

# 2068 CASSETTE CONNECTION

## Part II: Loading Tips

In the last issue, I recommended removal of a couple capacitors in the SAVE circuitry of the TS2068. This provides a "brighter" save signal, which makes subsequent loading more reliable. This is all that is required to get many systems working "up to spec," and makes the use of "fast-load" routines possible, even practical. On further research, however, I found that there can still be problems with some systems involving the LOAD portion of the computer-to-tape interface. In this article, I'll discuss the load circuitry, and suggest a few minor changes that you can make to improve reliability if you're still having trouble.

Before I get on with this, I should mention that NOT ALL TS2068's ARE CREATED EQUAL. I had the opportunity to look at a 2068 recently acquired from Games To Learn By (GTLB), and found that the small capacitors directly across the MIC and EAR jacks on the underside of the board were absent on this unit. Also, the two series 1N4148 diodes CR25 and CR26 (discussed later) were bridged with a single identical unit. Furthermore, there are appreciable discrepancies between the Timex schematic and the actual hardware. For example, the SAVE circuit shows yet another capacitor across the MIC output (C72) which is not even marked on the board on either unit I've seen. There are also various other capacitors and wires floating around which look suspiciously like "tack-ons."

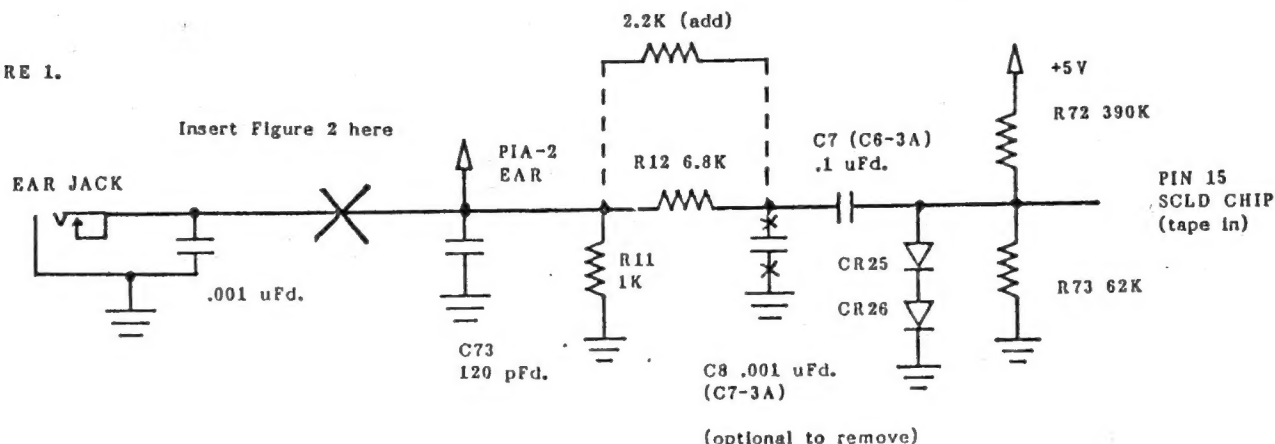
To complicate matters further, it appears that there are at least two discrete board patterns in existence, with different parts callouts for the same components. These alternate parts callouts are shown on the schematic in parentheses with a "-3A" suffix. For example, capacitors C7 and C8 in the LOAD circuitry (discussed later) are C6 and C7, respectively, in the "-3A" version. Both of the boards I've seen have a "-03D" suffix in the number under the "TIMEX 2000" legend and both corresponded with the "-3A" variation on the schematic, so presumably any board designated "-3A" or greater will follow the alternate part numbers on the schematic. The bottom line is that what you read here and elsewhere about the 2068 hardware may or may not jive exactly with your machine.

Now, let's see what we can do to make it easier to "get loaded" on the 2068. The applicable portion of the schematic is reproduced here in Figure 1. As in the case of the MIC jack, there is at least one capacitor (C73) directly across the EAR jack. Again, this (or these) were presumably included to help reduce radio and TV interference. It seems that Timex's philosophy was, "if some capacitors do some good, then more will do more good." Unlike the caps across the MIC port, however, the one or ones on the EAR jack have a negligible effect on the tape signal itself. This is because the impedance looking into the MIC input of the recorder is several magnitudes higher (typically about 50,000 ohms) than the impedance of the EAR output (around 10 ohms). As a result, there is nothing to be gained by removing these capacitors, so you might as well leave it in! Who knows, they might even help reduce interference slightly.

Looking further into the schematic, we find a resistor (R11, 1000 ohms) in parallel with the EAR jack as well. Again, this is so much greater than the output impedance of the tape recorder EAR jack that it has no significant effect on the tape signal. It was probably included to provide the DC return required by some recorders. After that is a little network consisting of two resistors R12 and R73, two caps C8 (C7-3A) and C7 (C6-3A), and two diodes (CR25 and CR26). This is essentially a "diode clamp" circuit, which shifts the signal from, say -3 to +3 volts, to about -4 to +1.2 volts. Also, it provides a low-frequency (LF) corner of about 230 Hz., and a high frequency (HF) corner near 23 kHz.

My reason for digging into this was that I sometimes couldn't get some tapes to load, even at maximum volume setting on my 6 volt TS2020 or Minisette IX's. A quick measurement showed that my line voltage was somewhat low, around 110 volts. My present home-sweet-home has long secondary power lines and electric heat; I found that some tapes would load ok with the heaters unplugged, but wouldn't "take" if the AC line voltage dropped below the rated 120 VAC. A colleague reported similar problems, especially when trying to use a fast-load program to speed up the tape processes. If you're having similar border-line sensitivity problems with tape loading, the following modification may quite possibly handle it.

FIGURE 1.



# THE CASSETTE CONNECTION

Fred Nachbaur

In Volume 1, I ran a series on improving cassette reliability on the ZX81. Well, now that the TS2068 has arrived, that's all obsolete, right? Wrong! If anything, in my experience the 2068 needs even more "outside help" in getting reliable loads.

First, let's take a look at the load signal itself. As you may have noticed, the actual program is preceded by a header which consists of about five seconds (4032 cycles) of an 806.5 Hz. tone. This "sync pattern" is presumably used to set timing and compensate for variations in recorder speed. This is followed by:

1. The type of save (program, numeric array, string array or code)
2. A name up to 10 characters
3. The length of the file
4. The starting line number, variable array or address
5. Then (in the case of program saves) the offset to the variables (VARS-PROG).

After the header is a brief silence (though I use that term loosely), followed by another 5 second sync pattern and the actual program or data. (This info is from the tech manual.)

The data is represented quite differently from the ZX81/TS1000. Instead of having pulses of fixed width, with five such pulses representing a "0" and nine pulses being a "1", the TS2068 uses the more conventional approach of sending a short pulse (period=.48 ms) for zeros, and a longer pulse (period=.96 ms) for ones. This is, by the way, the same kind of system used by SDS, Z-XLR8 and other fast-load programs for the ZX81. Although it is about four times as fast as the standard ZX81 load routines, it is still considerably slower than the "fast-load" routines; the average rate of data transfer is about 1400 baud (bits per second) whereas SDS, for instance, runs at about 3500 baud and Z-XLR8 is variable up to about the same speed.

According to the tech manual, the SAVE signal is processed with a low-pass filter whose corner frequency is 2.5 KHz., which is very close to the output frequency when sending all zeroes. As a result, the signal is considerably "rounded" before it gets to the recorder. This may help in preventing overshoots and harmonic effects ("beating" with the bias oscillator in the recorder), but it tends to make the signal mushier and less sharply defined in pulse-width. As a side note, the manual also claims that the SAVE signal is between 0.15 and 0.67 V p-p; if this were so, your recorder would be blasted so badly you'd only get garbage. Perhaps this refers to the signal at the edge connector, or perhaps they meant 0.15 - 0.67 MILLivolts (.00015-.00067 V).

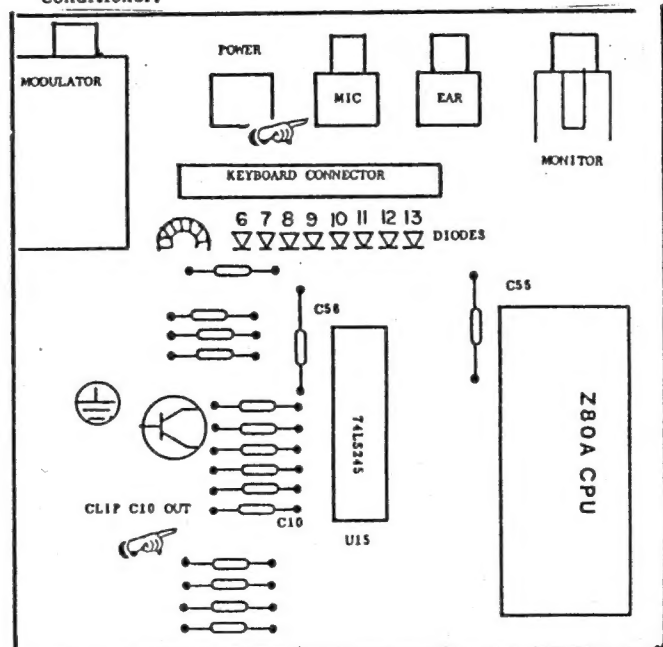
The LOAD section is low-pass filtered at a much higher breakpoint (23 kHz.), so the effect this filter has on the load signal is negligible; it would not even significantly reduce any horizontal blanking pulses that might find their way to the tape. The sensitivity of the LOAD section is even less than the ZX81/TS1000, so a comparator or op-amp pre-conditioner is definitely recommended for this machine. Also, because of the extreme rounding of the save signal, volume setting is more critical; the range over which the pulse width is within acceptable limits is quite narrow, even with a pre-conditioner.

Now, the good news. There is an almost absurdly simple way of fixing this.

1. Remove the 7 screws that hold the two case halves together, gently separate them and unplug the keyboard.
2. Remove the three screws that hold the board to the lower case-half, one near the speaker, one near the "Timex 2000" logo and one next to the cartridge connector.
3. Lift the board out and turn it over.
4. Shunted directly across the MIC jack, on the wiring side of the board, you'll find a small blue (on my machine) 120 pF. capacitor. Remove it, and throw it into your junk box. (Who knows, it might be useful for something.) This alone might do it.
5. There is another identical cap in parallel with this one, located about 2" to the left of the CPU and just to the left of an LS245 (U15). It is marked C10, though the legend may be hard to see; it's the smaller one, at the bottom of a row of components. Clip this one also.
6. Re-assemble the machine, and you're done.

Before I performed these "cap-ectomies" on my machine, I couldn't load tapes I'd saved on the TS2020 recorder, though other recorders worked sometimes. Now it works just fine, and is less sensitive to variations in playback level. What we've done is remove that low-pass filter and squared the save signal back up. It is unclear why C10 was included and downright obscure why another one was tacked on afterwards. Perhaps they were afraid of too much RFI and possibly flunking FCC testing.

If this results in too much noise on your machine, or if it didn't improve matters any, put one of the caps back in and try it again. It could be that you're getting harmonic "beating" with the recorder's bias oscillator. If you still have no joy, your problem is most likely with the load, rather than the save. Try a Winky board, VOTEM, the circuit in Volume 1 or other load signal pre-conditioner.





## 2068 LOAD Circuit Mods

- 1: Open the 2068 by removing the seven screws and disconnect the keyboard tail. (Thankfully, the KB tail on the 2068 is considerably more substantial than the ones on the ZX81/TS1000!)
- 2: Locate the 6800 ohm resistor, R12 (blue-grey-red-gold). This is about 1 cm. below and slightly to the left of the C10 capacitor you removed last issue. Bridge this resistor with a 2200 ohm, 1/4 watt unit (red-red-red-gold). This will make the mod easy to remove if it doesn't do the trick for you. Alternately, you may clip the 6800 ohm resistor and replace it with an 1800 ohm unit. This increases sensitivity, which in my case was enough to allow loading tapes that wouldn't quite "take" even at full blast. It also raises the LF corner, making the system yet more immune to low-frequency garbage.
- 3: I also removed capacitor C8 (C7-3A), even though doing so is not strictly necessary; the HF corner created by this cap is high enough to avoid trouble with the standard tape routines. However, it may conceivably get in the way if you later use VOTEM or other V-F (voltage to frequency) analog interfaces, or if you decide to experiment with fast-load routines. Although the 2068 (about 1500 baud) is a lot faster than the ZX81 (at about 300 baud), a good tape recorder will support even faster loading; up to about 3500 baud, or 440 bytes per second.
- 4: Reconnect the KB tail, and set the board back into the case. Test your modification. If you're satisfied that you now have enough sensitivity, screw the two case halves back together.

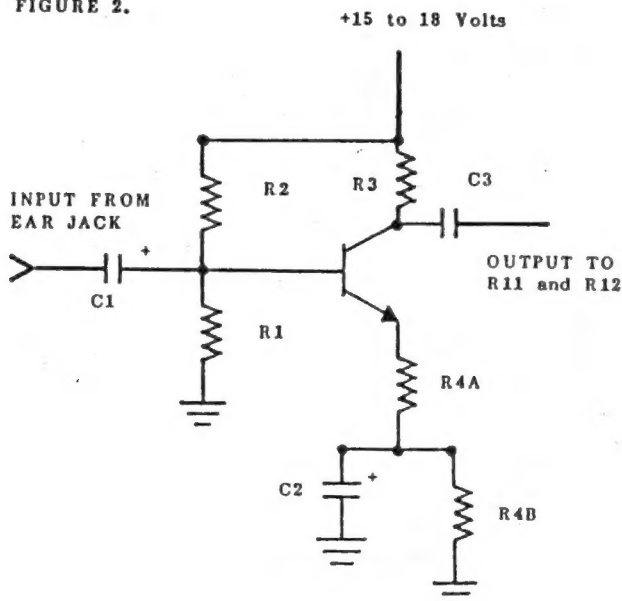
This will handle many loading problems. Aside from the comparatively low sensitivity of the 2068's load circuitry, there's not much for which it can be faulted. Unlike the ZX81, the SCLD custom chip apparently contains a comparator to square up the

signal. As a result, adding a comparator or Schmidt-trigger conditioner probably won't have a noticeable effect. However, if you have a tape recorder with a 6 volt supply, chances are you might still have trouble with sensitivity. If so, here are a few options:

- 1: You can use VOTEM to help out, but you'll need to make a couple modifications. First, you'll have to supply a 9-volt power source such as a "transistor radio" type battery. Then, you'll have to connect the junction of R1 and R6 to +9V instead of +5, to give you a larger output swing. One caution, however; this modification may make it unusable with the ZX81/TS1000, as these prefer a lower tape signal voltage and some of them balk if it's too high.
- 2: Get a recorder with a higher supply voltage, e.g. 7.5 or 9 volt. This will allow a higher output swing.
- 3: Replace your present 6V AC adaptor with a 7.5 volt unit. These are available from Radio Shack and other sources. Try to get it on the condition that you can return it if it doesn't do the job. The slightly increased supply voltage will not harm well-designed recorders, but may be just enough to push you "over the hump." This option, if it works, is a lot cheaper than buying a new deck.

You might experiment with the number of diodes in the clamp. (Be warned! You are dealing directly with the SCLD chip. DON'T BLOW IT!-ed.) This affects the positive clamp level, at the rate of about .6 volts per diode. As mentioned above, the units from GTLB have the two diodes (CR25 and CR26) bridged with a single one. I tried this on mine, and found that it actually seemed to make matters worse. I also tried adding an extra diode in series, and found no noticeable change. You might also try increasing C8 (C7-3A) to, say 0.22 uF., especially if you reduced R12.

FIGURE 2.



### PARTS LIST - 2068 LOAD AMP

C1-C3 - 1uFd., 16V tantalum  
 C2 - 47 uFd., 6V electrolytic  
 Q1 - general purpose audio transistor  
 2N3904, 2N4401, etc.  
 R1 - 910 Ohm 1/4 watt  
 R2 - 4700 Ohm, 1/4 watt  
 R3 - 470 Ohm, 1/4 watt  
 R4A - 100 Ohm, 1/4 watt  
 R4B - 33 Ohm, 1/4 watt

1"x 1" perfboard, wire, solder, sticky foam.

\*\* For the convenience of those readers who would rather not scout around for parts, I (Fred Nachbaur) will wire up these boards, so that they will be ready for you to install, for \$6.00 each (add \$3.00 for speedy mail service). You'll then only have to cut one trace and make four wire connections.

## The Final Solution

If you reduced the value of R12 as described above and still don't get enough sensitivity with your deck, and if the other "fixes" don't appeal to you, your best bet is to add a linear amplifier to boost the signal to the computer. Not much gain is needed, so a single-transistor "class A" stage is all you need. The circuit of Figure 2 is the answer that my ZX81 "CE AMP" program came up with. It has a voltage gain of about 3, and a P-P output swing of about 10 volts. Cost in parts is around \$4, depending on how much of the circuit you have in your junk box. On my machine, it allows most tapes to load reliably with a volume setting anywhere between 4 and 10.

Wire it up on a 1"x1" piece of perf board, cut the trace to the EAR Jack (underside of board) and connect the EAR Jack to the input. Connect the output to the left side of R12. Get the +15 volts power for the circuit from the on-off switch (SW2), the leg closest to the front edge of the board. A good place to get the ground is from the grounding strap soldered to the top of the video-section enclosure. (If you want to get fancy, you can make use of the expansion port area. A1-top left is ground, A2 is the EAR Jack and B3 is the +15V power.-ed.) The transistor can be virtually any NPN silicon type capable of at least 200 mW. dissipation and having a current gain (beta) of 50 or higher; e.g. 2N3904, 2N4401, etc. (Beware of the Radio Shack "2N3904 grab-bag." These are, in my experience, pretty lousy.)

Mount the board on top of the keyboard diodes (in front of the keyboard connector) using sticky-foam; watch for shorts. If you wish to use one of the little "Walkman"-type recorders with their 3V

supplies, increase the gain to about 4 by making R1 = 1000 ohms, R4A = 75 ohms, R4B = 62 ohms. C1 and C3 should be 16V tantalum units, C2 may be an aluminum electrolytic rated 3V or up.

## Load Amp for TS1000

You can use the one-transistor load amplifier circuit with the ZX81/TS1000/TS1500 by making the following changes in component values: \*

R1 = 1000 ohms	R4B - not used	* As for the 2068,
R2 = 4700 ohms	C1 = 1 uF.	pre-wired boards
R3 = 160 ohms	C2 - not used	are available from
R4A = 33 ohms	C3 = 3.3 uF.	the author for \$6

These changes are necessary because of the different supply voltage (9V instead of 15V) and input resistor value (220 ohms instead of 1000 ohms) as compared to the TS2068. Gain is set at about 3, and P-P voltage swing is just under 5 volts.

If you're using fast-load routines such as Z-XLR8, SDS, or Q-SAVE, it is recommended that you change capacitor C11 (located near the MIC Jack on the ZX81 board) from 47 nF. to 20-22 nF (.02-.022 uF.). This increases the HF corner of the SAVE circuitry from about 3.5 kHz. to over 7 kHz. and provides a brighter signal. I did this simply by breaking the existing capacitor in half horizontally, using a pair of wire nips; works fine, but not a "guaranteed" procedure. After doing this mod, I found that I could run SDS (similar to Z-XLR8 at top speed) even without a pre-conditioner.

So there you have it. That should wrap it up, at least from a hardware standpoint. In a future issue we'll try to get you a flexible, variable fast-load routine. 'Till then, "good loads, fair weather!"

## QL KEYBOARD MATRIX CHART

The following chart is reproduced from Fig 4.16, Sinclair service manual of October, 1985. Later issues apparently didn't include it - perhaps to sell more keyboard matrices. It has errors in it, but it'll serve as a starting point for construction of GOOD QL keyboards.

		J12										
		1	2	3	4	5	6	7	8	9	10	11
J11	9		CTRL	SHIFT								ALT
	8				ESC	+	BAR	4	4	ENTER	1	
	7				X	V	N		<		7	/
	6			Z	C	B	M	>	:	)	1	
	5			CAPS LOCK	S	F	G	K	:	(	.	
	4			;	#	J	A	D	H	J	L	P
	3			W	TAB	R	Y	I	(	9	0	-
	2			2	Q	E	T	6	U	B	0	
	1			F1	F2	F3	5	4	7	F4	F5	

# ZX81

From: ae522 (Daniel Ohlrich)

HERE IS A LITTLE UTILITY  
FOR MINI XMOD 1.5 TERMINAL  
PROGRAM WESTRIDGE VERSION. IT  
ENABLES YOU TO SELECT UPPER OR  
LOWER CASE OF CHARACTERS SENT  
TO ANOTHER COMPUTER. THE

CHARACTER TABLE FOR CHARACTERS  
SENT IS FROM 16694 TO 16719.

THE FOLLOWING UTILITY IS TO BE  
ADDED TO THE EXISTING MINIXMOD  
1.5 PROGRAM AS LOADED FROM TAPE.  
DELETE LINE 101

2000 REM MINIXMOD 1.5 UTILITY

2010 REM CHECK/CHANGE PARAMETER

2020 PRINT

2030 PRINT "CURRENT PARAMETERS:"

2040 PRINT

2060 IF PEEK 18222=79 THEN PRINT "8";TAB 10;"1";" NONE"

2070 IF PEEK 18222=123 THEN PRINT "7";TAB 10;"1";" EVEN"

2080 IF PEEK 18222=91 THEN PRINT "7";TAB 10;"1";" ODD"

2090 PRINT

2100 IF PEEK 16694=65 THEN PRINT " UPPER CASE SELECTED."

2110 IF PEEK 16694=97 THEN PRINT " LOWER CASE SELECTED."

2120 PRINT

2130 PRINT "CHANGE SETTINGS Y/N ?"

2140 LET A\$=INKEY\$

2150 IF A\$="" THEN GOTO 2140

2160 IF A\$<>"Y" THEN CLS

2170 IF A\$<>"Y" THEN RUN

2180 CLS

2190 PRINT

2200 PRINT "1) 7 1 EVEN"

2210 PRINT

2220 PRINT "2) 7 1 ODD"

2230 PRINT

2040 PRINT

2250 PRINT

2260 PRINT "4) TOGGLE UPPER/LOWER CASE"

2270 PRINT

2280 PRINT "SELECT CHOICE:"

2290 LET A\$=INKEY\$

2300 IF A\$="" THEN GOTO 2290

2310 IF A\$="1" THEN POKE 18222,123

2320 IF A\$="2" THEN POKE 18222,91

2330 IF A\$="3" THEN POKE 18222,79

2340 IF A\$="4" THEN GOSUB 2370

2350 CLS

2360 GOTO 2010

2370 REM CHANGE CHARACTER SENT A-Z TO LOWER CASE

2380 FAST

2390 CLS

2400 IF PEEK 16694=65 THEN GOTO 2510

2410 IF PEEK 16694<>97 THEN PRINT "\*\*\*\*CHECK SUM ERROR\*\*\*\*"

2420 IF PEEK 16694<>97 THEN STOP

2430 REM CHANGE CHARACTER SENT A-Z TO UPPER CASE

2440 FOR X=16694 TO 16719

2450 LET Y=(PEEK X)-32

Shown 79%, press SPACE for more, q to quit, h for help

2460 POKE X,Y

2470 NEXT X

2480 SLOW

2490 RETURN

2500 REM CHANGE CHARACTER SENT A-Z TO LOWER CASE

2510 FOR X=16694 TO 16719

2520 LET Y=(PEEK X)+32

2530 POKE X,Y

2540 NEXT X

2550 SLOW

2560 RETURN

AFTER THIS IS ENTERED, SAVE THE PROGRAM TO TAPE BY TYPING  
IN THE IMMEDIATE MODE:  
GOTO 100.

I HAVE ONLY MADE THIS  
MODIFICATION ON THE MINIXMOD 1.5 WESTRIDGE VERSION.

DAN OHLRICH (AE522)  
Hope this is of help.

From:

The Greater Cleveland

Sinclair Users Group

James G. DuPuy

6514 Bradley Ave. (Down)

Parma, Ohio, 44129

## TELECOMMUNICATION



### Cassette Connection Comments

Dear Fred, Thanks for your continued work in supporting our computers. Keep up on those "One Chip Mods." I have played around with the Cassette Connection Mods and offer some comments.

1. Removing the Cap on the Mic circuit really squares up the Save square wave.

2. The suggested 1800 ohm resistor for R12 on the Load side is rather touchy. 3400 Ohms gives better volume control range. The piggy-backing resistor does not seem to give as good a result as the single value (I'm not sure why).

3. Bumping the 6 Volts on the recorder to 7.5 Volts improves the recorder output more reliably than changing the value of the last resistor in the output line (change of waveform).

4. The 7.5 V. and 3400 Ohm resistor usage make the load conditioners less helpful, perhaps less needed. Uploading from the 1000 with these changes is better accomplished by setting the volume at the lowest possible loading value.

Marinus Heusveldt, Lantana, FL

### 2068 LOAD Notes

Stan Nagrod reports that removing R11 from his computer cured his loading problems. I had tried this on mine, and found no discernable difference (from the computer's standpoint, it shouldn't have any effect). Presumably, this is a function of the recorder rather than the computer. (You can't hurt anything by trying it.)

On that subject, the LOAD AMP (SWN 2/5 pg. 8) cannot harm your SCLD. Its design limits the output swing to well within the limits specified by Timex. If anything, LOAD AMP will help protect against excessive input voltage. You could add a reverse diode to the clamp at the input of the SCLD, but then the maximum voltage swing at the SCLD input is only about 1.8 volts, and you'd be defeating the whole purpose of getting more signal to its input.

I heard from several users who, like me, have more trouble with loading after the machine warms up. LOAD AMP cured this in every case.

I'm not supplying LOAD AMPS anymore; instead, I encourage user groups to have a local hardware hacker build them up for anyone who needs one. If anyone out there wants to build them for general sale, go for it. Consider this a release to public domain.



## 2068 Power Supply Make It Cooler & Quieter

I have discovered that programs SAVED to cassette tapes from the TS-2068 can have a very high Noise/Scratch background level making verification and loading a somewhat iffy proposition. The best way to determine if you have this problem is to monitor the signal on the tape aurally during loading. The background noise can be heard before the leader and between the leader and the program. If this condition creates a problem for you, the following will provide a solution.

The TS-2068, when operated from a DC supply voltage of more than 13 volts, creates a superfluous noise on the internal power distribution lines, probably from the action of the switching voltage regulator which supplies the regulated 5 volt supply. Somehow, this noise finds its way to the SPKR/TAPE output of the SCLD chip. For some unknown reason, if the DC supply voltage is reduced to something less than 13 volts this noise disappears. I have found that a supply voltage of about 8 volts gives very good results. There are two drawbacks: At less than 15 volts you get NO COLOR output and the A&J MicroDrive will not work.

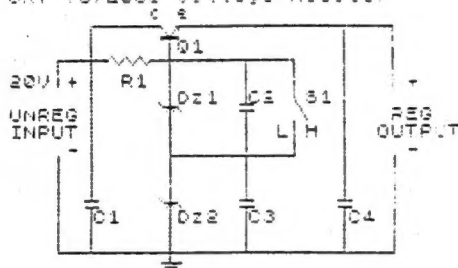
Because I sometimes wish to use the MicroDrive and the Cassette tape storage interchangeably, as in taking programs from the MicroDrive and giving them long term storage on the cheaper cassettes, I developed a voltage reducer to put in the cord of the TS-2068 power unit so that I can change the supply voltage from the normally used 15 volts to a lower 8 volts when I want to save a program to cassette tape. The supply voltage can be changed from 15 volts to 8 volts and back to 15 volts without affecting any of the program or data stored in the TS-2068 memory.

Also, by operating the TS-2068 at a normal 15-16 volt level rather than the power unit's output of about 21 volts, the heat dissipation in the TS-2068 is reduced considerably.

The schematic of the voltage reducer is self-explanatory. Two words of caution, however. Although the regulating transistor, 2N3055 or similar, is capable of passing many amps of current, it must be well heat-sinked as it dissipates about 5 Watts when delivering the low voltage output. When cutting the cord of the power unit, verify the polarity of the leads when they are reconnected remembering that the outer contact of the concentric connector is positive and the inner contact is negative.

-- J W Dowell

CMT TS/2068 Voltage Reducer



C1 - 0.1mf/Car R1 - 270 ohm/2W  
C2 - 100mf/10V Q1 - 2N3055 ETC  
C3 - 100mf/10V Q2 - 5.4V/.4W  
C4 - 0.1mf/Car Q3 - 9.1V/.4W

### TAPE

2 4 87

J W DOWELL (BEST OF SUM II, p15) says SAVE works better if voltage of power supply is reduced to 8 or 9 volts:- higher voltage adds noise to output signal. He also claims that 15 volts is sufficient in normal use, and this reduces heat dissipation within the computer.

Breadboarded his circuit, which reduces normal voltage of power supply to 15+, and has a switch to reduce further to 8+ volts. Tested. At 15+, computer worked, as did LOAD \* from disk. Do not know effect on COLOR. At LOW voltage, SAVE'd a program. This LOADED back (at 15+) without error.

2 7 87

Made PC board abd completed Dowell's circuit. Zeners are 6.8 and 9.1 volts. Used home-made box. Computer works at both high and low voltages. Switching from one to other has no effect on memory.

#### MEASUREMENTS:

Voltage with computer	ON	OFF
HIGH	15.4	16.0
LOW	8.7	9.2

NOTE: TIMEX Power Supply is about 20.5 volts.

2 10 87

Circuit boxed and completed and put to use. Everything appears to work properly. At low voltage, there is no color when monitor is used in composite video mode.